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**Water Potential Practice Worksheet #2**

Mrs. Krouse, AP Biology

*\*\*\*Thank you to Ms. Glick for providing this assignment!\*\*\**

1. If a plant cell’s ΨP = 2 bars and its Ψs = -3.5 bars, what is the resulting Ψ?

Hint: Which equation from your tutorial can you use to solve this problem?

1. The plant cell from Question #1 is placed in beaker of sugar water with Ψs = -4.0 bars. In which direction will the net flow of water be (into or out of the plant cell)?

Hints:

-The solute potential (Ψs) of a solution in an open beaker should be equal to its water potential (Ψ) because there is no pressure potential (ΨP).

-Water always moves from an area of high water potential (Ψ) to an area of low water potential.

1. The original cell from Question #1 is placed in a beaker of sugar water with Ψs = -0.15 MPa (megapascals). We know that 1 MPa = 10 bars. In which direction will the net flow of water be?

Hint: You need to convert the solute potential (Ψs) for the sugar water to bars before doing anything else!

1. The value for Ψ in root tissue was found to be -3.3 bars. If you place the root tissue in a 0.1 M solution of sucrose at 20 degrees Celsius in an open beaker, what is the Ψ of the solution, and in which direction will the net flow of water be?

Hint: How can you solve for the solute potential (Ψs) of the sucrose solution? Which equation from your tutorial can you use?

1. NaCl dissociates (breaks down) into two particles in water—Na+ and Cl-. If the solution in Question #4 contained 0.1 M NaCl instead of 0.1 M sucrose, what is the Ψ of the solution, and in which direction will the net flow of water be?

Hint: Which variable in the equation you used for #5 changes if you change the solute from sucrose to water?

1. A plant cell with a Ψs of -7.5 bars keeps a constant volume when immersed in an open-beaker solution that has Ψs of -4 bars. What is the cell’s ΨP?

Hint: If a cell keeps a constant volume, this means there is no overall movement of water into the cell or out of the cell. What does this indicate about the water potentials (Ψ) of the plant cell and the open-beaker solution?

1. At 20 degrees Celsius, a plant cell containing 0.6 M glucose is in equilibrium with its surrounding solution containing 0.5 M glucose in an open container. What is the cell’s ΨP?

*Note: Glucose does not break down into multiple particles in water.*

Hint: What can we assume about the water potentials (Ψ) of the cell and the surrounding solution if they are in equilibrium with one another?